

EXPLANATION OF PLATE XIII.

This plate is designed to express, in outline plans, the natural manner in which the *alimentary* system of the Cestoid and Trematoid Entozoa passes into that of the Nemertine and Planarian Annelida—that they are really constructed upon one and the same principle. Though not represented in this series of figures, the system of the nutritional fluids in these Entozoan and Annelidan groups conforms to one type. The channels for the fluids differ little in distribution from those of the alimentary system.

- Fig. 1.* Alimentary system of *Nemertes Camillæ*, the cæca (*b*) of which are charged with a *corpusculated* chyme; *e*, space external to the latter system filled with the chylaqueous fluid; *d*, shows that the true alimentary organ of this worm, in common with that of all Nemertine Annelids, is *closed at all sides*; *a*, œsophagus entering the proboscis.
- Fig. 2.* The *caudal* end of the alimentary organ of another Nemertine Annelid, *Borlasia* —?, proving it to be cæcal also at this extremity: *a*, cavity; *c*, cæca of this organ filled with a corpusculated fluid; *b*, space external to the alimentary cæcum filled with chylaqueous fluid.
- Fig. 3.* Alimentary system of a *Planaria*: *b*, mouth; *c*, cæca; *a*, arcolæ external to the digestive diverticula.
- Fig. 4.* Digestive system of a freshwater leech, *Clepsina* —?: *a*, cæca filled with corpusculated chyme.
- Fig. 5.* Ideal, transverse, section of *Aphrodita aculeata*, showing the distribution of the alimentary system, and its relations to that of the nutritional fluids: *a*, stomach; *b*, visceral cavity; *c*, scales, by the rising and falling of which a strong current of sea-water is maintained through the dorsal channel (*e*), by which current the fluid contents of the digestive cæcum (*d*) are aerated.
- Fig. 6.* Alimentary cæcum of one segment of *Tænia Solium*: *a*, *mouth of this segment* leading into a short œsophagus (*b*), and thence into the ramifications (*c*) of the digestive system.
- Fig. 7.* Alimentary system of a Trematoid Entozoon: *a*, œsophagus; *b*, digestive cæca.
- Fig. 8.* Ditto of *Amphistoma*: *a, b*, cæca of digestive system.
- Fig. 9.* Ditto of *Bothriocephalus latus* (a sterelminthous worm): *a*, *mouth of a single segment*; *b & c*, cæca of digestive system.
- Fig. 10.* Plan of a Nematoid worm, showing the great difference between the diameter of the intestine (*a*) and that of the space (*c*) enclosed by the integuments; *b*, reproductive organ.
- Fig. 11.* Another type of a Nematoid Entozoon (*Ascaris lumbricoides*), in which the intestine (*a*) is larger in diameter, and tied by frequent bridles (*b*) to the dense integuments (*c*).
- Fig. 12.* Transverse section of the same.

[To be continued.]

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

July 22, 1851.—J. E. Gray, F.R.S. &c., Vice-President, in the Chair.

ON THE ARRANGEMENT OF THE EDENTATE MAMMALIA.

By H. N. TURNER, JUN.

In offering to the Society a summary of my observations on the craniology of the Edentate order, I have not so great a number of

hitherto unrecorded facts to bring forward as in some of my former communications. The very remarkable modifications which this order is seen to present, not only in comparison with the rest of the Mammalian class, but also among its own members, and the wonderful variety of extinct gigantic species which the New World has yielded to research, have caused the osteology of the group to be more minutely investigated; while the small number of species and the striking external differences which they exhibit, have left but little room for doubt in the minds of naturalists as to their true arrangement. I will therefore simply point out such of the cranial peculiarities as seem to be characteristic of the order and of its families and genera, dividing it, as appears to me necessary, into five families, since the two forms inhabiting the Old World differ so much from each other, and from the three groups into which those of the New World naturally divide themselves, that although each consists of a single genus, and one of but a single species, it seems requisite that both should stand distinct. It will also be necessary to remodel the genera of the Armadilloes, and to define them anew by their external characters as well as by those of the skull, since the presence of a tooth in each of the intermaxillary bones of a single species of the family has prevented the essential similarities and differences from being duly appreciated.

Although some few naturalists may still associate this order with the true Ungulata, for the sake of keeping the divisions of the class within the predetermined number five, I think that most of those who have given particular attention to the subject will agree, that so natural and strongly-marked a group is well worthy of isolation, which was the opinion of Linnæus and Cuvier, although the former wrongly associated with it a few genera belonging properly to other groups.

The characters possessed in common by the members of so diversified an order, must be expected to be comparatively few; those which I have observed in the skull are as follows:—

The tuberosity of the maxillary bone is articulated by the whole of its upper surface to the frontal and orbitosphenoid bones.

The zygoma is flat and straight, projecting at once outwards and forwards, its articulating surface being more or less confluent with a concavity at the inner side of it which forms a portion of a more or less elongated cone, whose apex would point backwards. In such forms as have the articulation longitudinal, the glenoid surface is distinguishable from that of Rodents by its posterior termination, which is *not* a thin free edge like the anterior.

The alisphenoid bone never extends high, so that the pterygoid ridge forms its upper boundary, or even extends above it.

The absence of enamel in the teeth, when they exist, must also be named among the cranial characters.

Fam. 1. BRADYPODIDÆ.

The intermaxillary bones confined to the lower part of the nasal opening; the maxillary bones provided with simple teeth, shortened,

their malar processes much pushed forwards upon them, and the molar series converging behind; the posterior palatine foramina replaced by a series of minute openings extending the whole length of the palate; the malar bone having a descending masseteric process transversely compressed, longitudinally extended, and with a distinct superadded process arising between its frontal and zygomatic processes; the foramen rotundum distinct, and opening exteriorly at the base of the pterygoid process some distance below the sphenoorbital foramen and anterior to the foramen ovale; the zygoma straight and trigonal, its origin thick and extensive, reaching back quite to the posterior part of the squamous bone; the mastoid bone with a wide digastric fossa, and a strong thick styloid process, terminating in a circular concavity for the reception of the stylohyal bone; the lower jaw widened anteriorly with an extended symphysis.

It must be observed that the superadded process of the malar bone is peculiarly characteristic of this family, and is quite distinct from any of the processes of that bone to which special names have been assigned. It is situated between the frontal or postorbital and zygomatic processes, both of which seem also to exist in a more or less rudimentary form in most of the known species; and when the latter is wanting as in the genus *Cholæpus*, the fact that the new process stands aloof, above the zygoma, is enough to prevent its being taken for the zygomatic process, which in all mammalia possessing a complete zygomatic arch either abuts simply against the extremity of the zygoma, or more generally seems to support it from beneath.

The zygomatic process is well developed in the *Megatherium*, and completes the arch, leaving the other, which might be called the supratemporal process, projecting above it. In *Mylodon robustus* the frontal process is reduced to a slight angle upon the base of the supratemporal process. In the *Scelidotherium* the process existing above the zygomatic process appears to be broken off, but the obliquity of its base renders it improbable that it would be the true frontal process so largely developed.

The circular pit for the attachment of the stylohyal bone is precisely similar in the Sloths to that in the large fossil genera, and it is somewhat remarkable that Prof. Owen, while describing the character in these extinct forms, should have made no allusion to its existence in the recent Sloths, even though Cuvier expressly points it out. The tongue is largely developed in this family, and the living sloth may be seen to make great use of it in taking food into its mouth, as was observed by Mr. Ball, in a short communication published in the 'Proceedings' some years back. On the other hand, it is long and slender in the insect-feeding tribes, so that the maximum degree to which it was developed in the *Glossotherium* is certainly no indication that such was the food of that remarkable genus.

CHOLÆPUS, Illiger.

Intermaxillary bones small, produced anteriorly; postorbital process well-developed; malar bone with a well-marked frontal process, but no zygomatic process, the supratemporal process projecting

backwards or bent a little upwards; pterygoid bones inflated; crotaphite impression approaching near to the occipital ridge; tympanic bone reduced to a simple ring; lower jaw produced anteriorly, straight below, its condyle depressed; teeth $\frac{5-5}{4-4}$, simple, rounded, the anterior ones in each jaw enlarged, trigonal.

C. didactylus.

BRADYPUS, Gray.

Intermaxillary bones reduced or wanting; postorbital process slightly developed; malar bone with the frontal and zygomatic processes slightly marked, the supratemporal process rising obliquely; pterygoid bones inflated; crotaphite impression terminating at a considerable distance from the occiput; tympanic bone well-developed, forming a bulla; lower jaw with a flattened square process in front, deep posteriorly, the lower outline convex, the condyle elevated; teeth $\frac{5-5}{4-4}$, simple, rounded, the anterior ones similar, small in the upper jaw.

B. crinitus.

In addition to the character of the pterygoids, which, in the absence of actual knowledge, might possibly have belonged to age or sex, I find this species to be clearly distinguishable from those of the next genus by the great distance that intervenes between the posterior termination of the temporal fossæ and the occiput, which is much greater in the old specimens even than in the young of the genus *Arctopithecus*. The occiput also differs from them in being proportionally smaller, of a rounder form; the digastric fossæ converging a little superiorly, instead of diverging as in the other genus. The lower jaw also presents a character more decided than the anterior production which Mr. Gray points out in his paper on the genus *Bradypus*: it is much deepened behind, rendering the lower outline very convex. And further, there are certain characters pointed out by Cuvier in the 'Ossemens Fossiles' which appear to be constant, so far as I have been able to observe, as it is only in young specimens that the sutures are discernible. They are, first, that in this species, the *Ài à collier*, the nasal bones are bevelled towards the middle posteriorly, so that they form a point between the frontals, while in the other species they are bevelled in the opposite direction, the frontals descending between their extreme points. Secondly, that the palatine bone forms but a narrow slip within the orbit, and the alisphenoid bone occupies a much larger portion of the temporal fossa than in the other species.

The skull spoken of by Mr. Gray as being taken from a skin, presents characters intermediate between the other one and that upon which the *B. affinis* is founded, therefore I refrain from inserting the latter as a species until further evidences are obtained.

ARCTOPITHECUS, Gray.

Intermaxillary bones short and small; postorbital process slightly developed; malar bone with the frontal and zygomatic processes

slightly marked, or the former wanting, the supratemporal process rising obliquely; pterygoid bones compressed and simple; crotaphite impression extending to very near the occipital ridge; tympanic bone well-developed, inflated; lower jaw with its inferior outline concave posteriorly, its condyle elevated; teeth $\frac{5-5}{4-4}$, simple, rounded, the anterior ones similar, small in the upper jaw.

A. GULARIS. *À à dos brûlé.*

A broad patch of soft yellow hair between the shoulders, and a black line running through it down the back; the upper anterior molars proportionally larger, and the second less, than in the following species; the occiput again affords us a very good distinction, as it is much wider and not so deep as in the following species, and the foramen magnum not so large. Two skulls in the British Museum present these characters, and evidently belong to adult, probably aged, individuals; that of the skeleton, also from Bolivia, seems referable to the other species.

A. MARMORATUS.

Fur everywhere more or less lengthened, no yellow spots, dorsal line grey brown; anterior upper molars very small, the next rather larger than those which follow; occiput deeper and narrower than in the preceding species, its foramen larger.

The *A. Blainvillii* is not distinguishable by external markings, and the skulls bearing that name in the Museum collection all present a general robustness, such as age and sex might very probably occasion. One of them, which, from retaining some of the sutures, seems to be younger than the others, has the frontal bones less swollen, and the lower jaw with its angular process as much produced as in those labelled *marmoratus*, though deeper, but not so deep as in the others.

The *A. flaccidus* may be only a local variety, the skulls not being very clearly distinguishable, for there are not two between which some individual peculiarities may not be traced.

The skull to which the name *problematicus* is given is evidently young, having all its sutures well-marked, and in the absence of the fur cannot be safely looked upon as the type of a species. It agrees with the others in the character of the occiput, which distinguishes them all from the *A. gularis*, as well as from the *Bradypus crinitus*. The palæontologist is well aware of the uncertainty of establishing species upon trivial details of form, although slight distinctions are in some cases known to afford a true indication: the skulls of the Three-toed Sloths vary greatly, and all present a coarse, rough-hewn appearance which must detract from our confidence in little differences of detail. With regard to the lower jaw, they certainly do not present differences so strikingly characteristic as those upon which the species of *Mylodon* are established.

MEGATHERIUM, Cuvier.

Intermaxillary bones lengthened and prominent; postorbital process lengthened and drawn out, but not inflated; malar bone with its

frontal and zygomatic processes well-developed, the latter attached firmly to the zygoma; the supratemporal process rising obliquely; pterygoid bones compressed, and not inflated; crotaphite impression approaching near to the occipital ridge; tympanic bone attached, small, and not inflated; (immediately in front of the circular facet for the stylohyal bone there descends a strong process, which may probably belong to the tympanic bone and form a portion of a vaginal process;) lower jaw produced in front, deepened in the middle by the extensive implantation of the molars, the condyle much elevated; teeth $\frac{5-5}{4-4}$, quadrate, grooved transversely on the crown when worn, the cæmentum being thickened on the anterior and posterior surfaces; the posterior upper one small.

M. CUVIERI.

Dr. Lund figures a tooth having the characters of this well-known genus, but of smaller size, under the name of *Megatherium Laurillardii*.

MEGALONYX, Jefferson.

General cranial characters unknown; teeth $\frac{? ?}{4-4}$, subelliptical, with a ridge on the inner side.

M. Jeffersonii.

MYLONDON, Owen.

Intermaxillary bones small (lost in the skeleton); postorbital process but little developed, thick; malar bone with the frontal process indicated by a slight angle, the zygomatic well-developed, touching the zygoma, the supratemporal process rising obliquely; pterygoid bones thin and compressed; crotaphite impression approaching near to the occipital ridge; tympanic bone reduced and separate; (the foregoing characters can of course apply only to the *Mylodon robustus*, it being the only species of which the cranium is known;) lower jaw broad and more or less prolonged in front, the lower outline straight, the condyle depressed; teeth $\frac{5-5}{4-4}$, the anterior ones rounded or trigonal, the posterior ones larger, trigonal in the upper jaw, gradually becoming bilobed in the lower. The species can only be characterized by the lower jaw, as it is the only part that is known in all of them. The characters are taken chiefly from Prof. Owen's works.

M. DARWINII.

Lower jaw much produced anteriorly, with a double mammelliform tuberosity upon the symphysis below. The first tooth rounded or subtrigonal, the second subelliptical, with a slight depression on the inner side; the third subquadrate, grooved on the inner side; the posterior internal angle produced; the fourth bilobed, sharply grooved on the inner side.

M. HARLANI.

Lower jaw with the symphysis short; the second tooth subquadrate, grooved on the inner side, with the posterior internal angle

produced; the third trapezoid, obliquely placed, with the inner side rounded; the fourth bilobed, the inner groove biangular, and a small shallow one anterior to it.

M. ROBUSTUS.

Lower jaw produced and very broad anteriorly, the first tooth round, the second subtrigonal, grooved internally, the third subquadrate, oblique, the fourth bilobed, with a deep scallop on the inner side and a smaller one anterior to it.

GLOSSOTHERIUM, Owen.

Crotaphite impression approaching near to the occipital ridge; tympanic bone reduced and separate. The general cranial characters are unknown, but the fragment is recognizable by the great size of the surface for the stylohyal bone, and of the precondyloid foramen.

SCOLIDOTHERIUM, Owen.

Malar bone with a well-developed zygomatic process; the character of its frontal process cannot be determined through mutilation of the specimen; crotaphite impression approaching near to the occipital ridge; tympanic bone reduced and separate; lower jaw greatly curved below, its condyle depressed; teeth $\frac{5-5}{4-4}$, transversely extended, the anterior ones fully as large as the others, the first in each jaw elongate trigonal, the others gradually becoming bilobed, the last upper one trigonal.

S. leptocephalum.

PLATYONYX, Lund.

This genus is proposed by Dr. Lund, to include a series of species discovered by him, the first three of which he had previously referred to the genus *Megalonyx*, and Prof. Owen, in the conspectus at the end of his memoir on the *Myiodon*, has placed them in his genus *Scelidotherium*; but I prefer to adopt, for the present, Dr. Lund's latest arrangement, since in the lower jaws figured, the last lower molar has a deep groove on its posterior side, and the fourth species, of which an entire skull is figured (tab. 38), agrees in this character, and shows a marked distinction from the *S. leptocephalum* in the zygomatic arch being incomplete; the malar bone has no frontal process, and but a slight angular indication of the zygomatic process.

P. Cuvieri.

P. minutus.

P. Bucklandi.

P. Brongniartii.

In addition to these, Dr. Lund represents a metacarpal bone of a species which he calls *P. Owenii*, and an os scaphoides of the foot of another, which he names *P. Agassizii*.

The genera *Cælodon* and *Sphenodon* of Dr. Lund seem open to the objection suggested by Prof. Owen, namely that the teeth would be first developed in the form of hollow obtuse cones, not assuming the cylindrical form until worn down to the part which has acquired

in process of growth the normal thickness; but while I feel naturally cautious of introducing into my category any genera or species, the establishment of which is not made fully satisfactory to my mind, I must not be considered as rejecting any of those of Dr. Lund, when his illustrations and lists of names are the only evidences I can attain; since his original specimens are far beyond my reach, and my ignorance of the Danish language prevents my comprehending his descriptive memoirs.

Fam. 2. DASYPODIDÆ.

The nasal bones long, of nearly uniform width, their extremities projecting forwards beyond the intermaxillaries; the intermaxillaries are portions of cylinders, reaching further especially on their palatal surface than in the other families; the maxillary bone swollen and provided with simple teeth; its zygomatic process projecting boldly outwards, and a ridge continued from it for the masseter, the molar series diverging behind; the posterior palatine foramina are replaced by a row of minute openings extending the whole length of the palate; the malar bone, when there is a descending masseteric process, or a rudiment of one, has it compressed longitudinally, extended transversely; the foramen rotundum is included in the foramen sphenoorbitarium; the zygoma is flat, gently twisted upwards towards its extremity; the mastoid bone with a deep narrow groove, containing one or more mastoid foramina; the basi-occipital bone with a transverse depression just anteriorly to the edge of the foramen magnum, and (excepting in the genera *Tolypeutes* and *Glyptodon*) with an articular surface upon the lower edge of that foramen receiving the odontoid process of the axis when the head is deflexed; the occipital condyles are portions of cylinders, placed horizontally, each in a line with the paroccipital process; the precondyloid foramen is placed close to the condyle; the supra-occipital bone is broad above, forming on each side a strong thickened ridge; the lower jaw is narrowed and slenderly produced anteriorly.

The true affinities existing among the various Armadilloes have been rightly perceived by the Baron Cuvier, and are well pointed out in the 'Ossemens Fossiles'; but he did not designate the subgenera by any particular names, and naturalists, for the most part, have adopted the arrangement of Mons. F. Cuvier, which limits the genus *Dasyppus* to the single species that has teeth in the intermaxillary bone, and unites all the rest, excepting the Giant Armadillo, under the generic name *Tatusia*. Mr. Gray, in the 'List of Specimens of Mammalia in the British Museum,' has adopted in addition the genus *Xenurus* of Wagler, and it will be further necessary to make use of Illiger's genus *Tolypeutes* for the Apra or Three-banded Armadillo. The species *villosus* and *minutus* must be associated, as Baron Cuvier has done with the *Encoubert* in the genus *Dasyppus*.

The groups recognized in the 'Ossemens Fossiles' being thus restored and the names proposed by other authors applied to them, I shall proceed to characterize them by their external armour, by which they may very easily be distinguished, and to add the cha-

acters of the cranium, in which my observations have been assisted by the immortal work alluded to.

TATUSIA.

Ears thrown backwards and approximated; plates of the head of irregular shape and smooth; those of the scapular and pelvic shields much smaller than those of the bands, and surrounded with others smaller still; fore-feet with four toes, the claws straight, the index and medius nearly equal, the pollex and annularis small; maxillary bone terminating in a pointed process behind; teeth rather small, none of them being further back than the root of the malar process; this process concave anteriorly, projecting outwards and backwards; the infra-orbital canal entirely below it; malar bone simply a portion of an inverted arch, hollowed on the outer side for nearly its whole length by the masseteric impression, merely abutting against the zygoma; palatine bone reduced in vertical extent, being encroached on above by a large thickened portion of the ethmoid bone which appears in the orbit, the sphenopalatine foramen being a narrow fissure between them; pterygoid bone simply bordering the termination of the palatine, without hamular process; zygoma compressed and elevated, its glenoid surface circular; tympanic bone reduced to a ring; mastoid narrowed; lower jaw slender, its condyle but little elevated, transverse and flat, coronoid process elevated.

T. SEPTEMCINCTA.

Ears about one-third of the length of the head; plates smooth; tail as long as the body.

T. affinis of Dr. Lund may possibly be identical.

T. HYBRIDA.

Ears about one-fourth of the length of the head; plates of the pelvic shield convex and elevated; tail about two-thirds of the length of the body. The characters of this species, which was named by M. Desmarest, are carefully pointed out by Mr. Martin in the 'Proceedings' of the Society, January 1837.

Cuvier speaks of a third species brought from Brazil by M. de Saint-Hilaire, under the name of *Tatou verdadeiro*, differing from the mule Armadillo in having the tail terminated by a horny sheath of one piece, the bands broader, and the plates of the pelvic shield larger.

Dr. Lund figures two ossicles of a *Tatusia*, indicating dimensions much greater than those usually attained by specimens belonging to the genus, and applies the name *Dasyypus punctatus*. I find in the Museum of the College of Surgeons a recent carapace, denuded of its horny epidermal scutes, and wanting the scapular shield; it is as large as Dr. Lund's figures would imply, and has the same punctate depressions in the grooves which mark the surfaces of the component ossicles. It differs from a smaller one, still a large specimen, also denuded of the epidermal scutes, in the latter having the central area of each ossicle a little elevated at its posterior margin, and the puuc-

tate depressions fewer and smaller behind this area than in front of it ; while in the larger specimen they are all about equal in size.

It is difficult to compare these specimens with those which retain their natural covering ; but the punctate character seems to belong to the genus rather than to the species, it not being perceptible until the horny scutes are removed : and whether the *Tatusia punctata* be a species, or merely a large variety of one of the others, it would appear not to be extinct.

CHLAMYPHORUS, Harlan.

Plates of the head, the scapular shield and the body forming an uninterrupted series, each a parallelogram, those of the neck smaller, and those of the muzzle irregular ; pelvic shield small, flat, or slightly convex, placed vertically, at right angles to the dorsal armour, and composed of concentric semioval rows of trapezoid plates ; fore-feet with five toes, the medius being the longest, the two inner claws the smallest, and the three outer ones very deep and compressed ; frontal bone with a large thickened process above the eye ; malar bone thin, deep anteriorly, with a rudiment of a descending masseteric process assuming a transverse position ; auditory process bending forwards round the base of the zygoma ; lower jaw with the ascending ramus much elevated, the condyle higher than the coronoid process.

C. truncatus.

DASYPUS.

Head broad behind, ears wide apart, its plates irregular, marked like those of the body ; those of the scapular and pelvic shields oblong parallelograms, like those of the bands, but becoming pentagonal or hexagonal towards the neck and croup—all the plates marked with an indented pattern ; bands about six or seven ; fore-feet with five toes, the index nearly as thick as the medius, which is the longest, the claws a little twisted outwards ; maxillary bone terminating behind in a strong vertical column formed by the alveolus of the last tooth, and concealing the sphenopalatine and pterygo-palatine foramina ; teeth rather large ; malar process compressed in the antero-posterior direction, suddenly projecting, concave anteriorly ; infra-orbital canal short, pierced through the base of the process ; malar bone angular, with a rudiment of a descending process, compressed in the antero-posterior direction ; its zygomatic process deep, extending beneath the zygoma ; palatine bone ascending into the orbit ; no appearance of the ethmoid within the orbit ; pterygoid bones with well-defined hamular processes, bent outwards ; zygoma well-developed, flat ; its glenoid surface slightly convex, reniform ; tympanic bone well-ossified, forming a bulla ; auditory process largely developed ; mastoid bone very broad, placed entirely in the occipital region ; lower jaw deep and thick, its ascending ramus high ; coronoid process largely developed, condyle broad.

D. SEXCINCTUS.

Muzzle broad ; plates large, distinct, but slightly indented ; bands six or seven, *no* separate band on the anterior edge of the scapular

shield ; terminal plates of the bands and pelvic shield small ; hairs few, white ; teeth $\frac{9-9}{10-10}$, the first upper one on each side being in the intermaxillary bone.

D. VILLOSUS.

Muzzle broad ; plates closely united, roughly tubercular, those of the bands closely united and small ; bands eight ; a separate band on the anterior edge of the scapular shield, behind the row of nuchal plates ; terminal plates of the bands and pelvic shield large and falcate ; hairs profuse, brown.

D. MINUTUS.

Muzzle tapering, narrow at the end ; plates of the head smooth, those of the shield and bands closely united, and flatly tubercular ; terminal plates of the bands and pelvic shield large and falcate ; bands six or seven ; a separate band on the anterior edge of the scapular shield, behind the row of nuchal plates ; upper parts with black hairs ; sides of the head and limbs with brownish hairs ; under parts with whitish hairs ; teeth $\frac{8-8}{9-9}$, none in the intermaxillary bones, nasal and intermaxillary bones lengthened.

XENURUS, Wagler.

Head broad behind, ears wide apart, its plates irregular, smooth ; those of the scapular shield irregular in the middle, hexagonal towards the sides ; bands twelve, composed of short and square plates ; pelvic shield with square plates in the middle, becoming hexagonal towards the sides ; tail almost naked ; fore-feet with five toes, the index longest, but very slender, the three outer toes rapidly diminishing in length, but furnished with large claws, twisted outwards ; maxillary bones articulated posteriorly by suture to the palatine, its malar process thick, rounded anteriorly ; malar bone but slightly angular, its zygomatic process extending beneath the zygoma ; palatine bone ascending into the orbit, and pushing up the sphenopalatine foramen into a fossa which contains the foramina of the orbit ; pterygoid bones with their hamular processes styloform, projecting backwards ; zygoma small, rounded above ; tympanic incompletely ossified ; mastoid bone broad, placed obliquely ; lower jaw slender, its condyle elevated, reniform ; coronoid process feebly developed, lower than the condyle.

X. UNICINCTUS.

Cuvier mentions a species with a shorter and more entirely naked tail ; it is probably the same that has been called *nudicaudis* by Dr. Lund. *X. antiquus* of the same distinguished author may possibly be identical.

PRIODONTES, Frederick Cuvier.

Head broad behind, ears wide apart ; plates of the head and body as in *Xenurus* ; tail closely covered with quadrangular scales, placed in a quincuncial arrangement ; fore-feet as in *Xenurus*, the outer toe

much reduced; maxillary bone articulated posteriorly by suture to the palatine; teeth numerous and minute; infra-orbital canal long, commencing below the malar process, and terminating nearly on the middle of the bone; malar bone forming simply a portion of an inverted arch, round, and devoid of processes; palatine bone ascending into the orbit; pterygoid bone strongly developed, with an angular termination; zygoma rather small, the glenoid surface lengthened, the lower part of the squamous and the alisphenoid bone forming a longitudinal swelling within it; tympanic bone small, and loose; mastoid bone broad, forming the sides of the occiput which are rounded; lower jaw thin and compressed, condyle longitudinal, but little elevated; coronoid process much reduced.

P. gigas.

TOLYPEUTES, Illiger.

Head broad behind, ears wide apart; plates very closely articulated to each other, their surface divided by impressed marks, and studded with blunt tubercles, those of the scapular and pelvic shields varying from a square to a pentagonal or hexagonal form; bands three, composed of oblong parallelograms, equally subcircular, and closely articulated; fore-feet four-toed, the outer being absent; the medius slightly longer than the index, with a much larger claw, both having an outward twist; maxillary bone articulated posteriorly to the palatine, its malar process standing suddenly outwards, compressed; infra-orbital canal commencing below and behind its root, rather lengthened, rising a little in its course; teeth rather large; malar bone slender, and simply abutting by an oblique suture against the zygoma; palatine bone ascending into the orbit, pterygoids with blunt hamular processes, a little bent outwards; zygoma rather narrowed, glenoid surface flat, reniform; tympanic bone reduced to an annular form; lower jaw slender, condyle moderately elevated, reniform, coronoid process elevated.

T. TRICINCTUS.

Cuvier cites the *Cheloniscus* of Fabricius Columna as being this species, but represented with four bands instead of three; the last row of plates of the scapular shield is composed of oblong parallelograms like those of the bands, which may have given rise to such an error.

CHLAMYDOTHERIUM, Lund.

Judging by the plates that accompany Dr. Lund's Memoir, this appears to be a genus of extinct gigantic Armadilloes, having the body provided with moveable bands like the recent ones, and teeth of a compressed form, and irregularly fluted; two species are distinguished.

C. Humboldtii.

C. giganteum.

HETERODON, Lund.

Distinguished by the unequal sizes of the teeth: the fragment of

the lower jaw figured contains six teeth, of which two are much larger than the others.

H. diversidens.

EURYODON, Lund.

Dr. Lund figures a tooth resembling those of the Armadilloes, but apparently broader in proportion to its antero-posterior diameter.

E. latidens.

GLYPTODON, Owen.

Carapace ovoid, without distinction of shields or bands, composed of small hexagonal pieces with sculptured surfaces; teeth divided into narrow transverse lobes; malar bone with a lengthened descending process, placed transversely; zygoma flat, its glenoid surface elevated, transversely elongate, looking a little backwards; mastoid proportionally small, placed laterally.

G. CLAVIPES.

The central tubercle upon each ossicle large, round, or subhexagonal, conspicuous above the surrounding ones, which are small, and more cut up by reticulate depressions.

G. ORNATUS.

The central tubercle of each ossicle not conspicuously marked above the rest; all more finely granular.

This may possibly be the young of that to which the name *reticulatus* has been applied, and which, therefore, I will at present omit.

G. TUBERCULATUS.

Ossicles approaching to a square or rhomboidal form, their surface divided into numerous irregular elevations.

The genus *Hoplophorus* of Dr. Lund appears to be identical with *Glyptodon*; he figures two teeth in which the characters of that genus are clearly shown, and several detached ossicles and portions of carapace bearing a general resemblance to the species of *Glyptodon*, principally to the *G. ornatus*. He distinguishes two species, the *H. Euphractus* and *H. Selloi*. Prof. Owen refers to the *H. Euphractus* a portion of carapace brought home by Mr. Darwin, and figured in the 'Voyage of the Beagle,' which very closely resembles those afterwards figured in the 'Catalogue of Fossil Mammalia and Aves in the Museum of the Royal College of Surgeons' under the name *G. ornatus*.

I am not as yet acquainted with the *Pachytherium magnum* of Dr. Lund's catalogues.

Fam. 3. MYRMECOPHAGIDÆ.

The nasal bones simple, of uniform width, emarginated at the ends; the intermaxillary bones much reduced; the maxillary bones much lengthened, toothless, the malar process projecting backwards, outwards and downwards; the posterior palatine foramen single, or wanting; the malar bone reduced to a slender stylet free at the pos-

terior end; the foramen rotundum included in the foramen sphenorbitarium; the zygoma very small, and pushed quite to the anterior superior angle of the squamous portion; the supra-occipital bone encroaches upon the upper surface of the skull, and has a median protuberance; the lower jaw much lengthened and slender at the end, without coronoid process.

Not having seen the skull of the little Two-toed Ant-eater, I have used a little caution in characterizing this family. For example, I have avoided alluding to the peculiar character of the pterygoids, as Cuvier informs us that they do not enclose a long canal as in the larger species. I therefore limit the diagnoses of the genera to the few points, in which, in the absence of a skull of the small species, they are known to differ*.

MYRMECOPHAGA, Linnæus.

Fore-feet with four toes; hind-feet with five toes; palatine and pterygoid bones united beneath the nasal canal for their whole length.

M. JUBATA, Linn.

Varied with black and grey, the latter predominating on the head, back, sides, fore-limbs and tail; throat, a mark running obliquely from the shoulder upwards and backwards, and hind-limbs black; fur very coarse; tail but little longer than the body, very bushy.

M. TAMANDUA.

Head, shoulders, fore-limbs, outside of the hind-limbs, and middle third of the tail white; a stripe from each side of the neck over the shoulder and remaining parts black; tail but little longer than the body, its terminal third scaly. Varies chiefly by the diminution of the intensity of the black.

I have found that the Yellow Ant-eater, hitherto considered to be one of the varieties of this species, differs remarkably in the length and size of the tail; the ears also appear to be larger, but this latter character is less decisive, owing to the different degrees to which they may shrink when dry. A specimen in the British Museum, and one in that of this Society, resemble each other exactly, while a young pale specimen of *M. Tamandua* has a tail proportionally of the same length as the larger and darker individuals. Under these circumstances I have been induced to propose a name for the Yellow Ant-eater, deeming it probable that the species may be distinct.

M. LONGICAUDATA.

General colour uniform light ochraceous, a paler line runs down the middle of the back; tail nearly double the length of the body, its terminal half covered with small scales and a few scattered black hairs; ears large, round, about one-third the length of the head.

* I have since seen the cranial portion of the skull of the Little Ant-eater, and find that although the pterygoid bones do not enclose the nasal canal below, they resemble those of the larger species in their great extent backwards.

Although the flanks show a slightly darker reflection in certain directions of the light, there is no trace of the mark which runs across the shoulder.

On referring to the figure, in Krusenstern's Voyage (tab. 6 e), on which M. Desmarest founded his *Myrmecophaga annulata*, I find it to be a very excellent representation of a Coati-mondi, probably the brown species. The head is bent downwards, the tongue protruded, and curved beneath the left fore-foot; from under the further side of the foot there comes a small twig of a tree, which, if it were not branched, would look like a continuation of the tongue. But the figure published in Griffith's translation of the 'Règne Animal' is not so easy to interpret. The general form of the body is more like that of an Ant-eater, though rather too long and slender; the tapering head and the dark stripe from the end of the muzzle to the eye remind one of the *Myrmecobius*, which was not known until several years afterwards; the tail is just such as a Coati-mondi might have supplied. The figure is said to have been drawn from a stuffed specimen, but the authors do not state where the specimen existed, and possibly may never have seen it.

Cuvier asserts, with much probability, that the animal from which Buffon took his figure of the *Tamandua* was made up of the skin of a Coati-mondi, to which striped markings had been artificially applied.

CYCLOTHURUS, Gray.

Fore-feet with two toes, the outer one much the larger; "the palatines only meet below for two-thirds of their length, and the bony canal of the nares there terminates, the pterygoids not meeting, but presenting only two long parallel and little prominent crests."

C. DIDACTYLUS.

Dr. Lund inserts in his lists of fossil species one which he has named *Myrmecophaga gigantea*, but I have seen no representation of any portion of the animal among the figures published.

Fam. 4. MANIDÆ.

The intermaxillary bones small, having ascending processes running upwards and backwards; each encloses a separate incisive foramen; the maxillary bones short, toothless, their malar processes projecting backwards, outwards and downwards; the palatine bones much spread out in front, and with distinct posterior palatine foramina; the malar and lacrymal bones wanting, but a large lacrymal opening; the alisphenoid bone much reduced; the zygoma deep, thin, concave exteriorly, and pushed downwards to the anterior and inferior angle of the squamous portion; the occipital condyles prominent, oblique, the precondyloid foramina at some distance anterior to them.

This family consists of but one genus, containing several well-marked species.

MANIS, Linnæus.

In characterizing the species of this genus, I give the number of scales in each transverse row, instead of the number of longitudinal

rows, which has been the usual method adopted. The number in each case will appear much less, but it will be recollected that this is owing to the scales of one row being alternate with those of the next one.

M. PENTADACTYLA, Linn. (*macroura*, Desm.)

Each transverse row of scales composed of three on each side of the median one; scales striated at the base, smooth at the end, the striated part distinctly separated from the smooth portion; ends of the scales simple; under parts naked; tail very broad at the base, about equal to the body in length; fore-feet five-toed, the claw of the medius much the largest, that of the annularis next, that of the index much less, the other two very small; hind-feet with lengthened claws; limbs scaled to the bases of the claws.

M. JAVANICA, Desm.

Four scales on each side of the median one in each transverse row, the lower ones on each side, and the lateral ones beneath the tail, keeled and pointed at the ends; tail broad at the base, equalling the head and body in length; under parts with short white hairs; limbs scaled to the bases of the claws; fore-feet with the middle claw largest, the index a little less than the annularis, the others very small; hind-feet with lengthened claws.

M. TEMMINCKII, Smutz.

Body altogether very broad; scales broad, three on each side in every transverse row, striated to the tips which are rounded, none of them carinate; under parts naked; tail about the length of the body, broad and rounded at the end; limbs scaled to the bases of the claws; fore-feet with the middle claw largest, the two next less, the remaining two much less; those of the hind-feet vertical, truncated.

M. TETRADACTYLA, Linn. (*Africana*, Desm.)

Scales large, three on each side in every transverse row, striated to the tip, which is square, with a point projecting from the middle, the lower ones at the sides and the lateral ones beneath the tail carinate; tail double the length of the body, a little narrowed at the base, soon becoming broad; limbs only scaled at the base, then covered with black hairs like the under parts; fore-feet with the middle claw very long and compressed, the index and annularis much less and nearly equal, the minimus less still, the inner toe very small; hind-feet with lengthened claws, nearly equal.

M. MULTISCUTATA, Gray, Proc. Z. S. Feb. 1843.

Five scales on each side of the median one in every transverse row; scales striated to the tip, which is square, with a median point; those on the sides of the trunk and limbs, and the lateral ones beneath the tail, carinate; tail nearly double the length of the body, of moderate width; under parts with short whitish brown hairs; fore-

limbs scaled to the carpus ; toes all well-developed, except the thumb, which is small, the medius longest ; hind-feet scaled nearly to the base of the claws, which are all lengthened and well-developed, except the thumb, which is small ; the annularis nearly as long as the medius.

M. aurita, Hodgson.

Fam. 5. ORYCTEROPODIDÆ.

The nasal bones long and much spread out behind, narrowed and not projecting anteriorly ; the intermaxillaries well-developed, prominent below, not enclosing foramina ; the maxillary bones lengthened and deep, provided with compound teeth ; the palate terminating soon with a strong transverse ridge, having a pair of large posterior palatine foramina ; the lacrymal bone large, extending much upon the face ; the malar bone large, extending much upon the face, but its zygomatic process small and slender ; the frontal bone large and swollen, with a small and contracted post-orbital process ; the parietals extended downwards at their anterior inferior angles to articulate with the alisphenoids ; the zygoma slender, twisted as in the Armadilloes ; a strong post-articular and a post-auditory process, and just within the latter a short truncate styloid process, not enclosed by any vaginal process, as the tympanic bone is much reduced and separate ; the occipital condyles hemicylindrical, but with a portion of articular surface continued from them upon the lower edge of the foramen magnum ; the paroccipital processes in a line with them, but distinctly separated.

As this family consists, so far as is yet satisfactorily known, of a single species, its characters might be multiplied to almost any extent ; should another form be discovered, they will of course need revision.

This communication having extended far beyond the length that I at first contemplated, notwithstanding that I have limited myself in most cases to the distinctive peculiarities of the skull, it will readily be seen that, had I entered upon the whole osteology of the order, or even introduced in every instance the characters by which the genus or species may be known externally, I should have swelled this little monograph to such a degree as almost to preclude its insertion in the 'Proceedings' of the Society, and entailed upon myself an amount of labour from which I would by no means shrink, but fear I shall be compelled to defer until more favourable opportunities present themselves ; but I trust that the little I have as yet accomplished may afford the naturalist a clearer insight into the relations of the living Edentata among themselves, and with those that formerly peopled the portion of the world which was then, as now, the principal abode of this remarkable group.

Pimlico, July 1851.